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Through the Industrial Waste Studies Program, the U. S. Environmental Protection Agency is conducting a comprehensive study of industrial waste water technology in an effort to develop effluent limitation guidelines. During the first phase of the program studies of each of twenty-one industrial categories were completed under contract by private firms. Emphasis was placed on collecting the available data concerning the waste water involved, the available control and treatment technology, and the achievable effluent levels. The information contained in this document is based upon the data collected.

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U. S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF WATER PROGRAMS
DIVISION OF APPLIED TECHNOLOGY

THE INDUSTRIAL WASTES STUDIES PROGRAM

Summary Report on the

AUTOMOBILE INDUSTRY
(SIC 3711, 3712, 3714, 3461)

INTRODUCTION

Through the Industrial Waste Studies Program, the U. S. Environmental Protection Agency is conducting a comprehensive study of industrial waste water technology in an effort to develop effluent limitation guidelines. During the first phase of the program studies of each of twenty-one industrial categories* were completed under contract by private firms. Emphasis was placed on collecting the available data concerning the waste water involved, the available control and treatment technology, and the achievable effluent levels.

The information contained in this document is based upon the data collected. These data were generally considered inadequate to make a verifiable determination of effluent limitation guidelines. A second program phase is being initiated to develop the additional data to establish guidelines. Certain engineering judgments concerning technically achievable effluent levels for most establishments within particular industrial categories have been made by technical experts within the Agency, based upon the data collected and the guidance of highly qualified consultants.

The purpose of this report is to present the engineering judgments that have been made, and to identify the sources of detailed descriptive matter and data relevant to the subject industrial category. The effluent levels reported have not taken into account, in all cases, certain factors that must be considered further by users of this report. These factors, pertaining to individual establishments, include, but are not limited to the following:

- quality requirement for receiving water body
- quality of intake water
- materials involved in the process
- goods or services produced

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* Note: See the Appendix for a list of the industrial categories covered.

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- manufacturing process and technology employed
- size of the establishment
- age of the establishment
- plant location
- extent of existing waste water control and treatment
- degree of reasonability of costs

Background information and data collected through the contracted study for the subject industry are published in a EPA study report. Reference to the study report* and other publications used in the preparation of this summary report are given in the References section of this report.

Wherever possible, the industrial categories were subdivided on the basis of manufacturing processes, process elements, raw materials processed, or product output. The purpose of this approach is to allow for the wide diversity of operations within a single industrial category. The scope of coverage and the basis for subdivision for the subject industrial category is presented in the Industrial Category Description section.

Significant waste water characteristics are reported in two categories:

Group I - Effluent levels should be established for these parameters in almost all cases.

Group II - These parameters should be considered; and establishment of effluent levels should be determined on a case-by-case basis.

All of the significant waste water characteristics should be evaluated when initially establishing an effluent limitation. Subsequent monitoring requirements should be based on the characteristics of the particular discharge. While this list is essentially complete for the subject industry, there may be cases where other hazardous, toxic or polluting substances may be present in a discharge; where this possibility exists, these additional pollutants should be monitored and controlled as necessary.

A brief discussion of the available waste water technology for the subject industry is provided in this report; more-detailed information is available in the references. The control and treatment information is presented only to demonstrate that technology is available for meeting the effluent levels reported. The Environmental Protection Agency does not necessarily recommend any particular control or treatment methods, or combinations thereof, since it is recognized that alternative approaches may be more suitable in individual cases.

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*Note: Present reference is a draft of the contractor's study report.

Based on the data collected and the application of qualified engineering judgment, achievable effluent levels have been determined for the Group I parameters and are presented in Table 2. A brief discussion of the development of these levels is also presented. Individual plants currently may be achieving effluent levels superior to the levels reported; and conversely, some plants, because of atypical factors, may be unable to attain the effluent levels reported.

The information published in this report is intended to serve as an aid in establishing effluent limitations for industrial waste water discharges. A continuing effort is being made to collect additional data for updating and expanding the scope of this report.

REFERENCES

Information contained in this report has been drawn primarily from the following reference:

"An Industrial Waste Study of the Automobile Industry," U. S. Environmental Protection Agency draft report by Gurnham and Associates, Inc. Chicago, Illinois (September, 1971), 44 pages.

The referenced report presents data concerning the raw waste loads, treatment methods, and effluents of this industry on a nation-wide scale. Sources of this data have been the automobile manufacturers, trade association, the Michigan Water Resources Commission, and the personal experience of the contractor.

In addition, data from the following research report has been used in the preparation of this report:

"The Cost of Clean Water" Vol. 3, Industrial Waste Profile No.2, Motor Vehicles and Parts, Federal Water Pollution Control Administration Report by the Calgon Corporation, (1967).

INDUSTRIAL CATEGORY DESCRIPTION

The Standard Industrial Classification (S.I.C.) Manual (1970) lists automobile manufacturing under the following headings:

3711	Motor Vehicles
3712	Passenger Car Bodies
3714	Motor Vehicle Parts and Accessories
3461	Automobile Stampings

The Industrial Waste Study of the Automobile Industry was restricted to the following:

Motor vehicles and motor vehicle equipment

a. Engines: casting, machining, minor part production, assembly

b. Vehicle assembly: steel sheet cutting, body forming and welding; phosphating and other industrial coating; electroplating; assembly

The following areas were specifically omitted:

Power steering units, transmissions, brake systems, glass and other parts normally produced in separate plants; trucks, military vehicles, off-the-road vehicles and other special products.

Achievable effluent levels presented in this report have been developed for the following standard manufacturing processes:

Casting
Engine Machining and Assembly
Stamping (major metal forming operations)
Frame Manufacture
Conversion Coating and Plating
Final Assembly (body assembly and final vehicle assembly)[1]

Note [1] Ford and Chrysler normally combine body and final vehicle assembly operations in one plant. Body stamping and body assembly are sometimes carried out in the same plant. At General Motors, body assembly is generally done by the Fisher Body Division while final vehicle assembly is done by one of the assembly plants.

WASTE WATER CHARACTERISTICS

The most significant waste water parameters for this industry are given in Table 1.

TABLE 1

SIGNIFICANT WASTE WATER PARAMETERS

FOR THE

AUTOMOBILE INDUSTRY
(SIC 3711, 3712, 3714, 3461)

GROUP I	GROUP II
Suspended Solids	COD
Oil and Grease	Chlorides
BOD5	Nitrate
Chromium	Ammonia
Phosphorus	Sulfate
Cyanide	Tin
Copper	Lead
Nickel	Cadmium
Iron	Total Dissolved Solids
Zinc	
Phenols	

In addition to the parameters listed, all hazardous substances should also be considered.

Standard raw waste load data for the Group I parameters are given in the Industrial Waste Study Report (pp 24-29).

AVAILABLE TECHNOLOGY

The purpose of this section is to demonstrate the availability of waste water treatment technology for attaining the effluent levels reported. EPA does not necessarily advocate or recommend the use of the treatment methods discussed and encourages the use of other methods, including in-plant controls, to achieve equivalent or better results. Available in-plant waste water control technology is exemplified by water reuse and recycle and elimination of unnecessary water usage.

Current treatment methods practiced by the automobile industry are many and varied. The following treatment methods are currently practiced within the industry:

PARAMETER	TREATMENT
Suspended Solids	Sedimentation, Clarification
Iron, Nickel, Copper, Zinc	Precipitation by pH Adjustment
Oil and Grease	Chemical Emulsion Breaking, Skimming, Air Flotation
Cyanide	Detoxification by Chemical Oxidation
Chromium	Chemical Reduction, pH Adjustment, Precipitation, Clarification
BOD5	Retention and Clarification in holding lagoon

Phosphorus reduction is normally achieved by the treatment methods described for oil and grease. Phenolic wastes from casting operations are usually discharged into municipal systems employing secondary treatment. The achievable effluent level for phenol from casting operations is based on the average raw waste flow and an effluent concentration of 5 parts per billion phenol.

ACHIEVABLE EFFLUENT LEVELS

Using the average raw waste flows for each manufacturing process presented in the Industrial Waste Study and the effluent characteristics of well-designed and well-operated treatment systems, the achievable effluent levels were calculated and are given in Table 2.

TABLE 2

ACHIEVABLE EFFLUENT LEVELS FOR THE

AUTOMOBILE INDUSTRY
(SIC 3711, 3712, 3714, 3461)

Parameter	Casting	Engine Machining & Assembly	Stamping	Frame Manufacture	Conversion Coating & Plating	Final Assembly
BOD_5	NVE[1]	NVE	0.098	NVE	NVE	0.24
Chromium-total		NVE	NVE		2.8	0.01
Copper					2.8	
Cyanide					0.03	
Iron	0.08			0.001	2.8	
Nickel					2.8	
Oil & Grease	0.78	0.02	0.049	0.01	NVE	0.12
Phenols	.0004	NVE		0.00001		
Phosphorus		0.002	0.0049	0.001	NVE	0.01
Suspended Solids	2.7	0.07	0.098	0.036	57.0	0.41
Zinc		0.002	NVE		2.8	0.01
Units	lb/ton hot metal	lb/engine	lb/body	lb/frame	lb/million ft^2 plated	lb/vehicle

Effluent pH range: 6.0-9.0
Note[1]: Parameter may be significant but no value has been established

APPENDIX

Industrial categories covered by the Industrial Waste Studies Program are as follows:

- Basic Nonferrous Metal Works and Foundries
- Basic Steel Works and Foundries
- Beet Sugar Processing
- Beverages
- Canned and Preserved Fruits and Vegetables
- Cement, Lime, Gypsum, Flat Glass and Asbestos Products
- Dairy Products
- Fertilizers
- Grain Milling
- Inorganic Chemicals
- Leather Tanning and Finishing
- Livestock Feedlots
- Meat Products
- Motor Vehicles & Aircraft Plating & Finishing
- Organic Chemicals and Petrochemicals
- Paper and Allied Products
- Petroleum Refining
- Plastic Materials and Synthetics
- Steam Generating Plants
- Textile Mill Products